CLAIMS

1.   A method, comprising:

identifying at least two subsets of pixels within a block of an image;

forming a plurality of pixel groups from said at least two subsets of pixels, each said pixel group having at least one pixel from a first of said at least two subsets and at least one pixel from a second of said at least two subsets;

producing a plurality of difference values, each said pixel group providing one of said difference values, each said difference value being based on differences between pixel values of pixels within one of said pixel groups; and

modifying pixel values of pixels in less than all of said at least two subsets, thereby embedding a bit value into said block.

2.   The method of claim 1 wherein said less than all subsets comprises only one subset.

3.   The method of claim 1 wherein said modifying causes a logical-1 bit value to be embedded into said block.

4.   The method of claim 1 further comprising:

identifying a contrast status of said block; and

customizing said modifying according to said contrast status.

5.   The method of claim 4 wherein said identifying said contrast status comprises:

identifying a status of a histogram of said block.

6.   The method of claim 5 wherein said identifying said contrast status comprises:

identifying a block difference value for said block, said block difference value being equal to an arithmetic average of said difference values.

7.   The method of claim 4 further comprising:

employing error correction coding to correct any bit errors in said block.

8.   The method of claim 1 wherein said at least two subsets comprises exactly two subsets and said pixel groups all include exactly two pixels and wherein said producing comprises:

setting each said difference value equal to a difference in pixel values between said exactly two pixels of each said pixel group.

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9.   The method of claim 1 wherein said at least two subsets comprises only said first subset and said second subset and said block comprises a checkerboard distribution pattern of pixels of said first subset and said second subset.

10.   The method of claim 1 further comprising:

calculating a block difference value for said block of said image, said block difference value being equal to an average of said plurality of difference values.

11.   The method of claim 10 further comprising:

changing said block difference value by a shift quantity.

12.   The method of claim 11 wherein said shift quantity has a predetermined magnitude.

13.   The method of claim 11 wherein said changing said block difference value causes a bit value to be embedded in said block of said image.

14.   The method of claim 11 further comprising:

establishing a difference value threshold.

15.   The method of claim 14 wherein said shift quantity exceeds a magnitude of said difference value threshold.

16.   The method of claim 11 wherein said changing said block difference value comprises:

embedding a logical-1 bit value in said block of said image.

17.   The method of claim 16 wherein said embedded bit value is recoverable.

18.   The method of claim 16 wherein said embedding comprises:

concealing said bit value in said block of said image.

19.   The method of claim 16 wherein said embedding comprises:

providing at least a portion of a digital signature in said block of said image.

20.   The method of claim 1 wherein said pixel values are gray-scale values.

21.   The method of claim 1 wherein said pixel values comprise chromatic information.

22.   A method, comprising:

dividing a block of an image into at least two subsets of pixels, the block including an embedded bit value;

5   forming a plurality of pixel groups from said at least two subsets of pixels, each said pixel group having at least one pixel from a first of said at least two subsets and at least one pixel from a second of said at least two subsets;

producing a plurality of difference values, each said pixel group providing one of said difference values, each said difference value being based on differences between pixel values

10   of pixels within one of said pixel groups;

extracting said embedded bit value from said block; and

restoring said pixel values to a condition of said pixel values prior an introduction of said embedded bit value, said restoring comprising maintaining pixel values of pixels in at least one of said subsets unchanged.

15   23.   The method of claim 22 wherein said extracting comprises:

extracting a logical-1 bit value from said block if said block difference value exceeds a difference value threshold.

24.   The method of claim 22 wherein said extracting comprises:

extracting a logical-0 bit value from said block if said block difference value is less than a

20   difference value threshold.

25.   The method of claim 22 further comprising:

identifying a contrast status of said block; and

customizing said extracting according to said contrast status.

26.   The method of claim 25 further comprising:

25   customizing said restoring according to said contrast status.

27.   The method of claim 25 wherein said identifying said contrast status comprises:

identifying a status of a histogram of said block.

28.   The method of claim 25 wherein said identifying said contrast status comprises:

identifying a block difference value for said block.

30   29.   The method of claim 22 further comprising:

employing error correction decoding to correct any error in said extracted embedded bit value.

30.   A method, comprising:

identifying at least two subsets of pixels within a block of an image;

5   forming a plurality of pixel groups from said at least two subsets of pixels, each said pixel group having at least one pixel from a first of said at least two subsets and at least one pixel from a second of said at least two subsets;

producing a plurality of difference values, each said pixel group providing one of said difference values, each said difference value being based on differences between pixel values

10   of pixels within one of said pixel groups;

calculating an initial block difference value for said block of said image, said initial block difference value being equal to an average of said plurality of difference value; and

establishing a final block difference value for said block of said image based on one of a logical-0 bit value and a logical-1 bit value indicated for inclusion in said block, said

15   establishing comprising leaving pixel values for pixels within at least one of said subsets unchanged.

31.   The method of claim 30 wherein said establishing said final block difference value comprises:

changing said initial block difference value by a shift quantity, thereby embedding a logical-1

20   bit value in said block of said image.

32.   The method of claim 31 wherein said changing said initial block difference value comprises:

changing pixel values of pixels within only one of said subsets.

33.   The method of claim 30 wherein said establishing said final block difference value

25   comprises:

leaving said initial block difference value unchanged, thereby embedding a logical-0 bit value in said block of said image.

34.   An apparatus, comprising:

30   A computing system having at least one processor capable of operative communication with a main memory; and

a local memory coupled to each of said at least one processor,

wherein said computing system is operable to:

identify at least two subsets of pixels within a block of an image,

5   form a plurality of pixel groups from said at least two subsets of pixels, each said pixel group
having at least one pixel from a first of said at least two subsets and at least one pixel from a
second of said at least two subsets,

produce a plurality of difference values, each said pixel group providing one of said difference
values, each said difference value being based on differences between pixel values of pixels
10   within one of said pixel groups, and

modify pixel values of pixels in less than all of said at least two subsets, thereby embedding a
bit value into said block.

35.   The apparatus of claim 34 wherein said less than all subsets comprises only one subset.

36.   The apparatus of claim 34 wherein said operability to modify is operable to cause a
15   logical-1 bit value to be embedded into said block.

37.   The apparatus of claim 34 wherein said computing system is further operable to

identify a contrast status of said block, and

customize said modifying according to said contrast status.

38.   The apparatus of claim 37 wherein said operability to identify said contrast status
20   comprises:

operability to identify a status of a histogram of said block.

39.   The apparatus of claim 38 wherein said operability to identify said contrast status
comprises:

operability to identify a block difference value for said block, said block difference value being
25   equal to an arithmetic average of said difference values.

40.   The apparatus of claim 37 wherein said computing system is further operable to:

employ error correction coding to correct any bit errors in said block.

41.   An apparatus comprising:

30   a computing system having at least one processor capable of operative communication with a
main memory; and

a local memory coupled to each of said at least one processor,

wherein said computing system is operable to:

5   divide a block of an image into at least two subsets of pixels, the block including an embedded bit value;

form a plurality of pixel groups from said at least two subsets of pixels, each said pixel group having at least one pixel from a first of said at least two subsets and at least one pixel from a second of said at least two subsets;

10   produce a plurality of difference values, each said pixel group providing one of said difference values, each said difference value being based on differences between pixel values of pixels within one of said pixel groups;

extract said embedded bit value from said block; and

restore said pixel values to a condition of said pixel values prior an introduction of said
15   embedded bit value, said restoring comprising maintaining pixel values of pixels in at least one of said subsets unchanged.

42.   The apparatus of claim 41 wherein said operability to extract comprises:

operability to extract a logical-1 bit value from said block if said block difference value
20   exceeds a difference value threshold.

43.   The apparatus of claim 41 wherein said operability to extract comprises:

operability to extract a logical-0 bit value from said block if said block difference value is less than a difference value threshold.

44   The apparatus of claim 41 wherein said computing system is further operable to:

25   identify a contrast status of said block; and

customize said extracting according to said contrast status.

45.   The apparatus of claim 44 wherein said computing system is further operable to:

customize said restoring according to said contrast status.

46.   The apparatus of claim 44 wherein said operability to identify said contrast status
30   comprises:

operability to identify a status of a histogram of said block.

47.   The apparatus of claim 44 wherein said operability to identify said contrast status comprises:

operability to identify a block difference value for said block.

5   48.   The apparatus of claim 41 wherein said computing system is further operable to:

employ error correction decoding to correct any error in said extracted embedded bit value.

49.   A storage medium containing an executable program, the executable program being operable to cause a computing system to execute actions including:

10   identifying at least two subsets of pixels within a block of an image;

forming a plurality of pixel groups from said at least two subsets of pixels, each said pixel group having at least one pixel from a first of said at least two subsets and at least one pixel from a second of said at least two subsets;

producing a plurality of difference values, each said pixel group providing one of said
15   difference values, each said difference value being based on differences between pixel values of pixels within one of said pixel groups; and

modifying pixel values of pixels in less than all of said at least two subsets, thereby embedding a bit value into said block.

50.   The storage medium of claim 49 wherein said less than all subsets comprises only one
20   subset.

51.   The storage medium of claim 49 wherein said modifying causes a logical-1 bit value to be embedded into said block.

52.   The storage medium of claim 49 wherein said executable program is operable to cause said computing system to execute the further actions of:

25   identifying a contrast status of said block; and

customizing said modifying according to said contrast status.

53.   The storage medium of claim 52 wherein said identifying said contrast status comprises:

identifying a status of a histogram of said block.

30   54.   The storage medium of claim 53 wherein said identifying said contrast status comprises:

identifying a block difference value for said block, said block difference value being equal to an arithmetic average of said difference values.

55.   The storage medium of claim 52 wherein said executable program is operable to cause said computing system to execute the further action of:

employing error correction coding to correct any bit errors in said block.

56.   A storage medium containing an executable program, the executable program being operable to cause a computing system to execute actions including:

dividing a block of an image into at least two subsets of pixels, the block including an embedded bit value;

forming a plurality of pixel groups from said at least two subsets of pixels, each said pixel group having at least one pixel from a first of said at least two subsets and at least one pixel from a second of said at least two subsets;

producing a plurality of difference values, each said pixel group providing one of said difference values, each said difference value being based on differences between pixel values of pixels within one of said pixel groups;

extracting said embedded bit value from said block; and

restoring said pixel values to a condition of said pixel values prior an introduction of said embedded bit value, said restoring comprising maintaining pixel values of pixels in at least one of said subsets unchanged.

57.   The storage medium of claim 56 wherein said extracting comprises:

extracting a logical-1 bit value from said block if said block difference value exceeds a difference value threshold.

58.   The storage medium of claim 56 wherein said extracting comprises:

extracting a logical-0 bit value from said block if said block difference value is less than a difference value threshold.

59.   The storage medium of claim 56 wherein the executable program is operable to cause a computing system to execute the further actions of:

identifying a contrast status of said block; and

customizing said extracting according to said contrast status.

60.   The storage medium of claim 59 wherein the executable program is operable to cause a computing system to execute the further actions of:

5   customizing said restoring according to said contrast status.

61.   The storage medium of claim 59 wherein said identifying said contrast status comprises:

identifying a status of a histogram of said block.

62.   The storage medium of claim 59 wherein said identifying said contrast status
10   comprises:

identifying a block difference value for said block.

63.   The storage medium of claim 56 wherein the executable program is operable to cause a computing system to execute the further action of:

employing error correction decoding to correct any error in said extracted embedded bit value.

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